Project Summary
Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: **Forecasting in Support of Adaptive Management of the Rocky Mountain National Park Elk Herd**

Discipline: Natural
Type of Project: Technical Assistance/Research
Funding Agency: National Park Service
Other Partners/Cooperators: Colorado State University
Effective Dates: 7/15/2014 – 4/30/2019
Funding Amount: $33,712

Investigators and Agency Representative:
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Project Abstract: The National Park Service manages the abundance of elk wintering in Rocky Mountain National Park (RMNP) to meet objectives specified in the recently developed Elk and Vegetation Management Plan (EVMP) (http://parkplanning.nps.gov/romo). The EVMP specifies that the elk population will be maintained within a target range of 600 – 800 animals. To achieve these objectives, the population is managed adaptively. Each year, the size of the population will be assessed relative to the target range and, based on this assessment, management actions will be chosen to assure that the trajectory of the population remains within that range.

Essential to the success of this approach is a model of elk population dynamics that allows managers to forecast the effect of alternative management actions on the elk population. In earlier work, Hobbs and Hoeting (2009) developed a forecasting model that predicts the future size of the RMNP elk population based on historic data and current census estimates. Because the model uses historic data to estimate uncertainties associated with these predictions, it is feasible to specify the probability that the next year's population will be within limits specified by park management. It is also feasible to estimate the probability distribution of the current population size in a way that includes historic as well as current data and that responds to all sources of uncertainty revealed by the full, historical time series of observations of the elk population.

This model provides a firm, statistically defensible basis for adaptive management of the park's elk herd. Adaptive management will be implemented as follows. Each year, the size of the park's population and its sex and age composition will be estimated using modern census methods developed in a separate project. Using the forecasting model, the current year's data will be combined with the full time series of data in from previous years to estimate the probability distribution of the current and subsequent year's population size. These probability distributions form the basis for choice of management actions, particularly the number of animals to be culled. Moreover, the model's predictions from the previous year will be compared with the current, realized population estimate obtained from census. This comparison may motivate changes in the model to improve the accuracy of its predictions. This cycle will be repeated annually, allowing continuous improvement in the model and in management.

Outcomes with Completion Dates:
Final Report – May 30, 2019 or four weeks after receipt of NPS comments, whichever is later.

Keywords: population models, elk management, Rocky Mountain National Park, Colorado State University